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(19)

(54) IMPROVEMENTS IN VALVES

(71) We, DUNLOP LIMITED, a British Company of Dunlop House, Ryder Street, St. James's, London S.W.1, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to an improved valve for the inflation of a pneumatic tyre, and more particularly to an improved valve of the kind designed to be incorporated in the inner tube of a pneumatic tyre.

The provision of valves for pneumatic tyres which have inner tubes presents problems different from those connected with tubeless tyres where the valve need not be connected to rubber but may be fixed in an aperture in the wheel rim. However, a tyre mounted on a spoked wheel, such as a bicycle, motor cycle and some car wheels, normally has an inner tube and in this case the valve stem which is to project through a hole in the wheel rim must be made integral with the rubber inner tube. This is done by bonding to the metal stem a rubber ferrule which is vulcanised to the inner tube in register with a preformed hole. When the inner tube is assembled on the rim the projecting valve stem is passed through a hole in the rim.

In the past it was customary for bicycle tyre valves to use as the valve member a length of rubber tubing which surrounded a lateral orifice in the valve body screwed into the stem. This type of valve was suitable for inflation of the tyre by a hand pump but not by an air compressor such as is available in garages.

Valves suitable for inflation by a compressor and which can be secured to a tyre inner tube have a valve member urged to the closed position by a spring which surrounds a pin extending from the valve member. The free end of the pin is accessible outside the tyre, inner tube and rim assembly, so that by depressing the pin the valve can be unseated to deflate the tyre.

A defect of most of the valves of this type which are currently available is that the valve member seats against the inner axial end of the valve stem. This has the disadvantage that dirt, chalk or the like inside the inner tube readily interposes itself between the valve member and its seat causing the valve to leak. Another drawback is that a long pin is required to extend from end to end of the stem and body assembly.

A valve is known in which these drawbacks are avoided by locating the valve seat within the valve body. This seat takes the form of a step between a narrower diameter, axially outer end of the valve body, through which the pin extends, and a larger diameter axially inner end of the assembly in which a compression spring is located to bias the valve member against the seat. The spring is held in compression by a tubular metal closure screwed into the axially inner end of the valve stem before rubber formations surrounding and bonded to the stem are vulcanised to the inner tube. This "Fleuss" valve has a valve member and seat less accessible to foreign matter inside the inner tube and requires a shorter pin but it has the disadvantage that once vulcanised into position in the inner tube the closure for the axially inner end of the stem which compresses the spring is no longer accessible so that if the valve fails it is impossible to replace the faulty components.

A principal object of the present invention is to provide an improved valve of the type last described which will have among its advantages the facility to dis-assemble the valve member, spring and pin without removing the valve assembly from an inner tube and indeed without removing the inner tube from the tyre and rim assembly in which it is incorporated.

In accordance with the present invention there is provided a valve for a pneumatic tyre comprising a tubular stem surrounded by and bonded to an elastomeric ferrule, an end of the stem exposed from the ferrule being received in a tubular body, the stem and body being releasably inter-engaged by internal screw threads of the body engaging

external screw threads of the stem, the bore of the body being reduced in diameter intermediate its ends to provide a valve seat, a seal of diameter greater than the narrower diameter part of the bore of the body, a pin extending from the seal through the body whereby the seal can be unseated, and a compression spring which, in the assembled state of the stem and body, is located between the said end of the stem and the seal to bias the latter into contact with the seat.

The stem, as in conventional valves, is surrounded and bonded to a ferrule which can in turn be vulcanised to an inner tube, but the interior of the valve is accessible either to clean it or to replace the spring or seal simply by inscrewing the body from the stem. This is possible even when the inner tube surrounds a rim, the body projecting from a hole therein, and is in turn surrounded by and enclosed in a pneumatic tyre mounted on the rim.

In accordance with a preferred feature of the invention the stem is surrounded by and bonded to a sleeve portion of the rubber ferrule which extends along the stem to a position where it will be contacted by one end of the body when the latter is screwed onto the stem. In this way the sleeve portion of the ferrule by abutting the inner end of the body prevents any escape of air through the screw-threaded connection between the body and stem.

A preferred embodiment of the present invention will now be described with reference to the accompanying drawing, which is a sectional elevation of a valve assembly in accordance with the invention.

The valve assembly illustrated comprises a tubular stem 10 which is surounded by and bonded to a rubber ferrule 11 which comprises a sleeve portion 12 from the axially outer end of which a skirt portion 13 extends radially of the stem. The axially inner end 14 of the stem 10 is formed with screw threads which are engaged by screw threads in the interior of the tubular body 15. The sleeve portion 12 of the ferrule extends along the stem 10 to a position where it will be engaged by the screw-threaded end 16 of the body 15 when the latter is fully screwed home on the stem 10 so as to provide a seal against the escape of air through the screw threads.

Intermediate its ends the bore of the body 15 is reduced in diameter to provide a frusto-conical valve seat 17. In the assembled state of the valve, as shown, a seal or valve member 18 is located in the wider diameter part of the bore of the body and is urged into sealing contact with the seat 17 by a compression spring 19 which is trapped between the valve member 18 and the axially inner end of the stem 10.

A pin 20 integral with the seal or valve member 18 extends through the narrower diameter portion of the bore in the valve body and the axially outer end of the body is screw-threaded at 21 for the reception of the usual dust cover or cap (not shown).

In use the skirt 13 of the ferrule is vulcanised to a rubber inner tube so that the bore of the stem 10 is in register with a hole preformed in the inner tube. The inner tube is then placed around a wheel rim so that the stem projects through a hole in the rim whereby the inner tube can be inflated from outside the assembly of rim and pneumatic tyre in which the inner tube is enclosed. The inner tube is inflated by replacing the dust cover on the threads 21 by the discharge line of inflation means such as a hand pump or that of an air compressor, whereupon the seal or valve member 18 is displaced off the seat 17 by incoming air pressure, compressing the spring 19. Whenever air pressure inside the inner tube exceeds air pressure acting on the opposite side of the seal 18 it is closed against the valve seat 17 by the spring 19.

The assembly illustrated has a valve member which seats near to the axially outer ends of the valve body which has the two advantages that it is relatively unexposed to foreign particles inside the inner tube and that only a relatively short pin 20 is required for the manual or mechanical displacement of the valve member off its seat when it is desired to deflate the inner tube. On the other hand, if any part of the assembly becomes defective it is a simple matter to deflate the inner tube and remove the body by unscrewing it from the stem, providing access to the spring 19, seal 18 and pin 20 for cleaning or replacement. This facility is obtained without danger of leakage because one end of the body 15 makes an airtight seal with the sleeve portion 12 of the rubber ferrule.

WHAT WE CLAIM IS:—

1. A valve for a pneumatic tyre comprising a tubular stem surrounded by and bonded to an elastomeric ferrule, an end of the stem exposed from the ferrule being received in a tubular body, the stem and body being releasably inter-engaged by internal screw threads of the body engaging external screw threads of the stem, the bore of the body being reduced in diameter intermediate its ends to provide a valve seat, a seal of diameter greater than the narrower diameter part of the bore of the body, a pin extending from the seal through the body whereby the seal can be unseated, and a compression spring which, in the assembled state of the stem and body, is located between the said end of the stem and the seal to bias the latter into contact with the seat.

2. A valve as claimed in Claim 1, wherein

the stem is surrounded by and bonded to a sleeve portion of the rubber ferrule which extends along the stem to a position where it will be contacted by one end of the body when the latter is screwed onto the stem.

3. A valve for a pneumatic tyre substantially as herein described with reference to and as illustrated in the accompanying drawing.

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1 SHEET *This drawing is a reproduction of the Original on a reduced scale*